RECR8OHIORIVER

A Water Quality Recreation Management Application to Have a Safe and Enjoyable Time on the Ohio River

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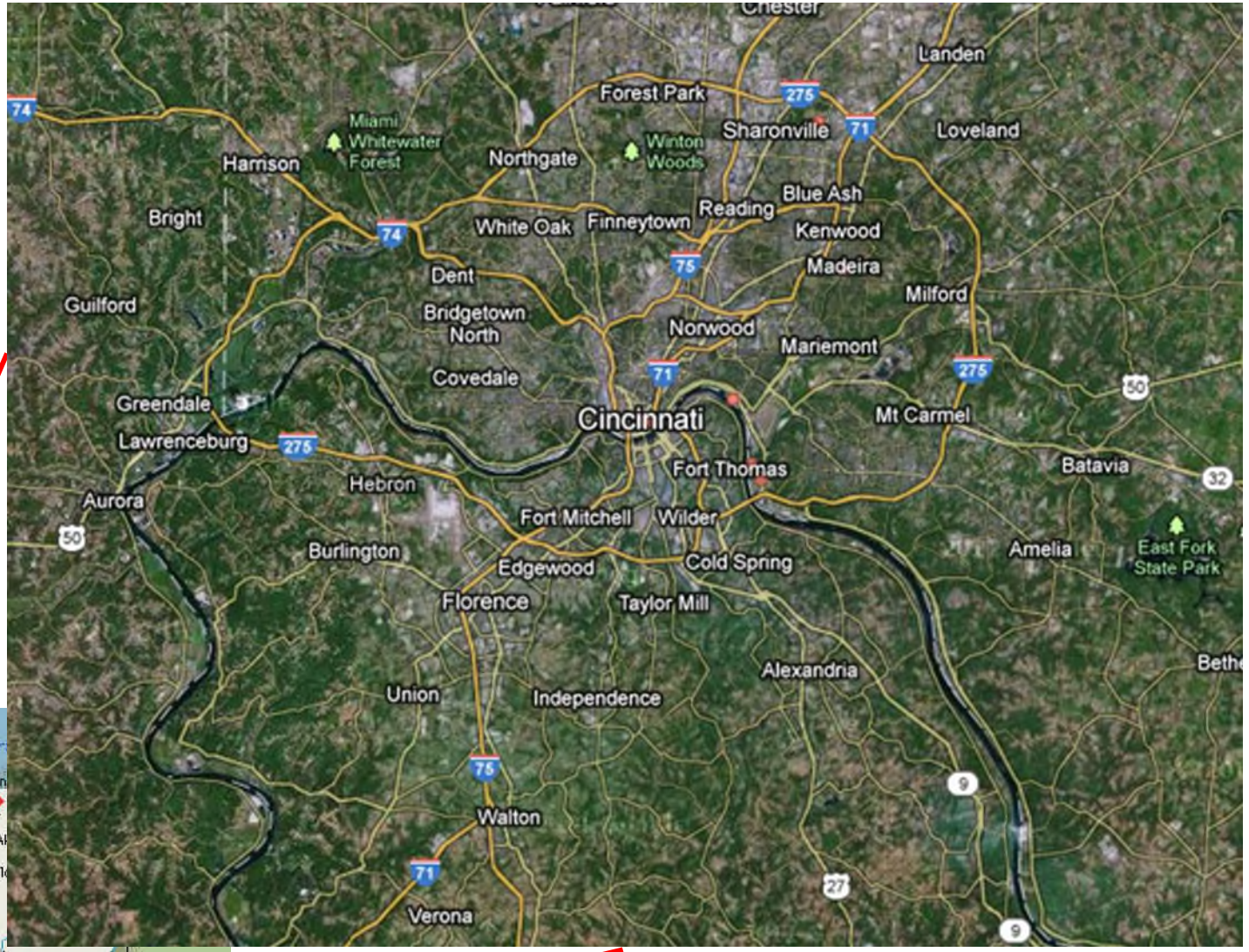
Outline

- Overview of Ohio River Recreation
- Modeling
- System Architecture
- Application/Website
- Next Steps
- Questions


Landen
Forest Park
Sharonville
Loveland
Miami Whitewater Forest
Harrison
Northgate
Winton Woods
Blue Ash
Bright
White Oak
Finneytown
Reading
Kenwood
Madeira
Dent
Milford
Guilford
Bridgetown North
Norwood
Mariemont
Covedale
Greendale
Cincinnati
Mt Carmel
Lawrenceburg
Fort Thomas
Batavia
Hebron
Aurora
Fort Mitchell
Wilder
Burlington
Amelia
East Fork State Park
Edgewood
Cold Spring
Florence
Taylor Mill
Alexandria
Union
Independence
Walton
Verona
74
275
71
75
50
32
9
27


CANADA
MICHIGAN
Lake Erie
Toledo
Cleveland
Sandusky
Brook Pk.
Maumee
Findlay
Mansfield
Marion
INDIANA
OHIO
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Springfield
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Fairborn
Xenia
Lancaster
Ohio
Middletown
Marietta
PENNSYLVANIA
Norwood
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Cincinnati
Scioto
Portsmouth
WEST VIRGINIA
KENTUCKY
VIRGINIA

Overview of Ohio River Recreation…

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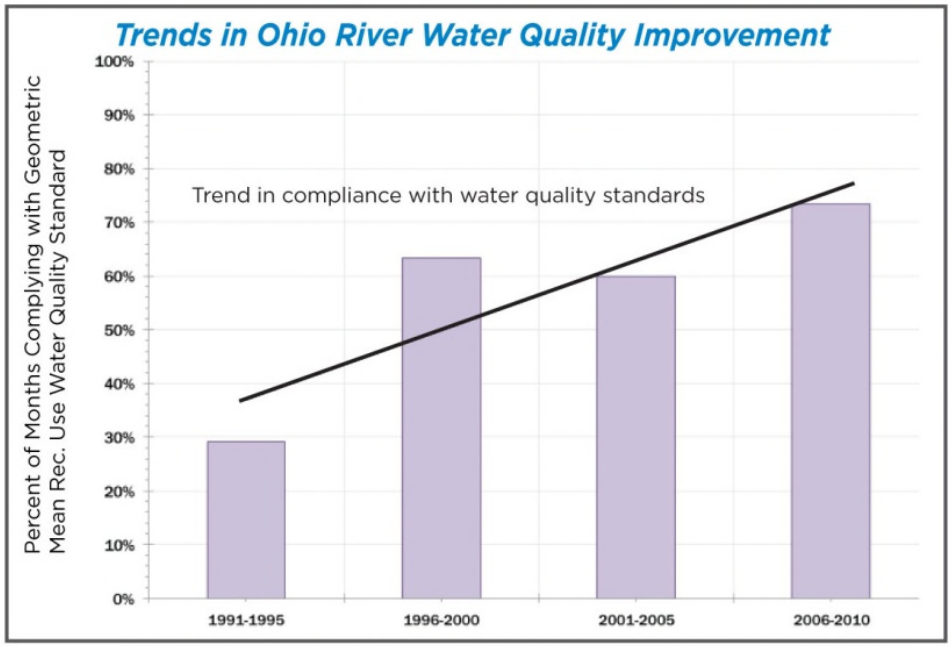
- Water quality in the Ohio River has consistently improved over the past 20 years.
- As a result, recreational use standards are met more frequently, making it safer to recreate on the Ohio River.



The overall trend indicates that compliance with safe recreating standards will continue to improve.

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Overview of Ohio River Recreation…

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- MSD is committed to:
  - Improving water quality in the Ohio River and its tributaries
  - Promoting these local waterways as natural and economic assets to this region

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Overview of Ohio River Recreation…

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Recreation Management Program

Purpose of program:

- Foster public awareness of water quality (*E. coli* counts)
- Assist public health agencies to inform public about health-related issues
- Facilitate informed decisions regarding recreational use of local waterways

Overview of Ohio River Recreation…

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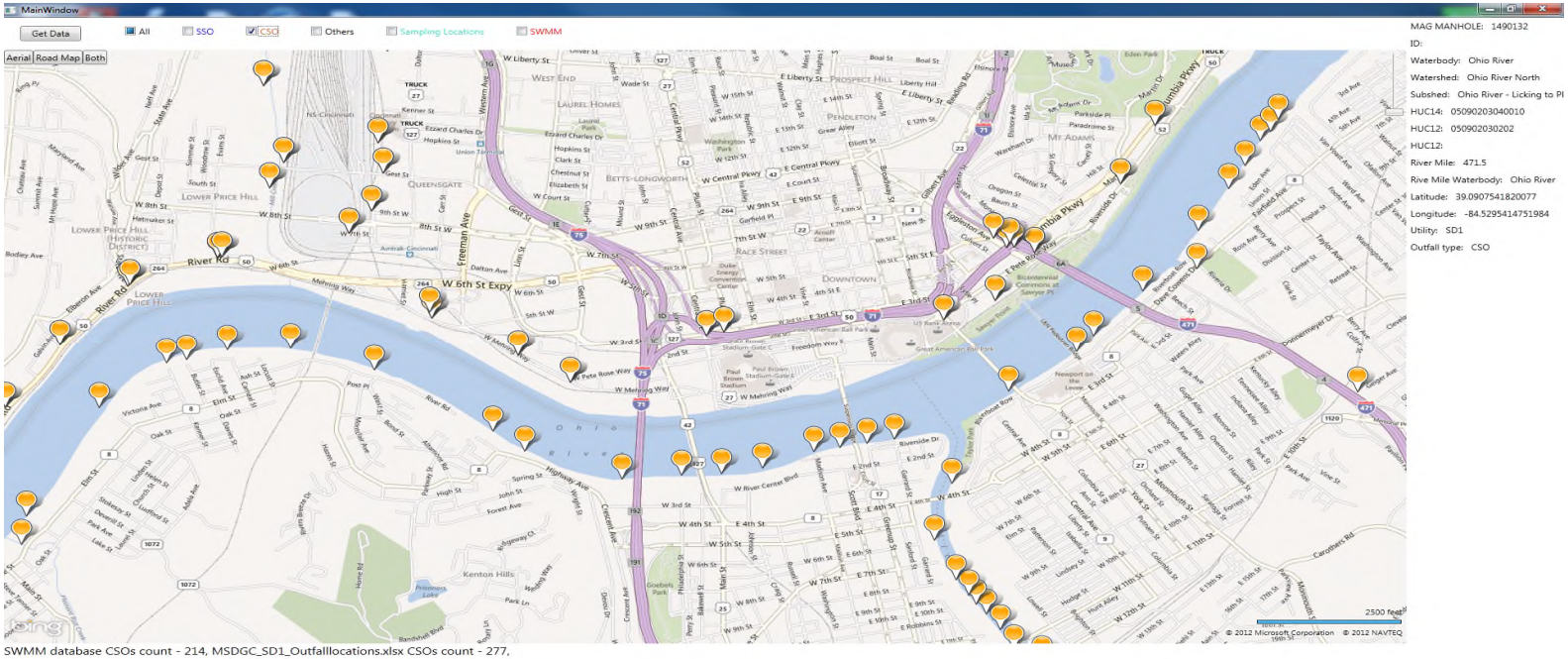
Recreation Management Program

Current efforts:

- Sampling on the Ohio River during the recreation season (May – October)
- Creating water quality models for *E. coli*
  - Fate and transport
  - Predictive
- Establishing baseline levels for biological, chemical and physical conditions of Ohio River tributaries
- Developing tool to inform the public about water quality during the recreation season

Modeling

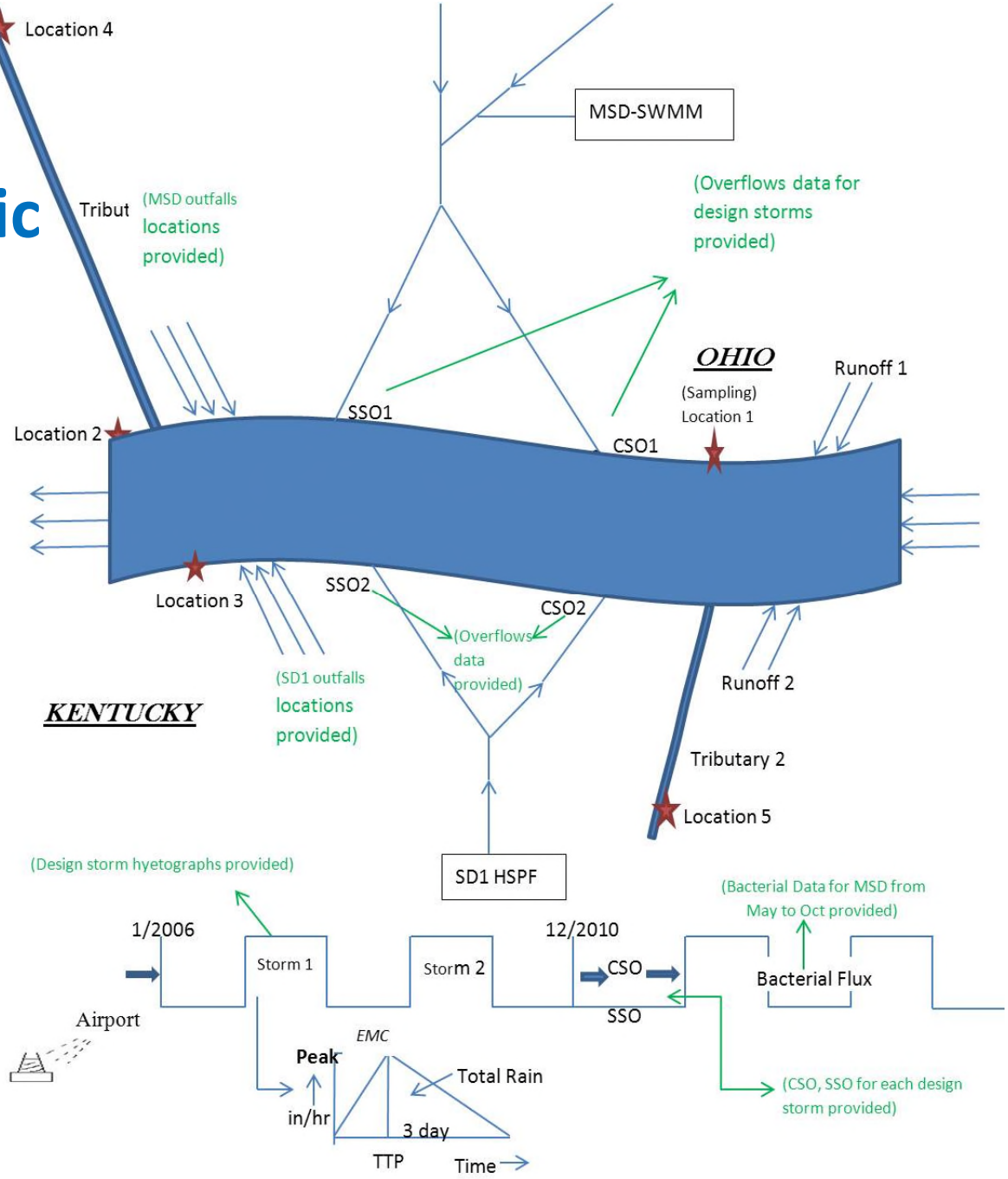
- CSO's along OH River:



SWMM database CSOs count - 214, MSDGC_SD1_Outfalllocations.xlsx CSOs count - 277,

- CSO's examined using a custom Bing maps application.
- Rain downloaded from Rain Vieux.
- Velocity calculated at Cincinnati, Meldahl Dam, Markland Lower.
  Velocity= (flow/y)*680

System Schematic



Modeling

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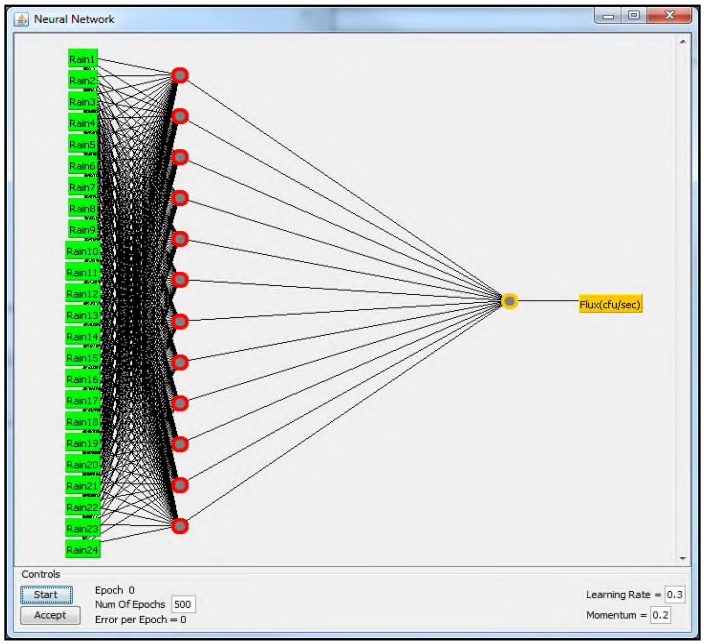
- Utilized the data collected by MSD, SD1, and ORSANCO over the years
- The predictive water quality model was developed using Artificial Neural Network (ANN)
- The ANN engine used was WEKA
- The *E. coli* data rich part is in the Cincinnati metropolitan area between the I-275 bridges



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Modeling

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- Many factors affect the modeling of *E. coli* especially in dynamic system as the Ohio River, such as:
  - CSOs
  - Temperature
  - Flow
  - Precipitation
  - Location
- Major factors in the success of predictive modeling are:
  - Data quality (time, location)
  - Data integration from different sources
  - Precipitation

Modeling

- Attributes were past 48Hr rain, Maximum of Rain, Cumulative of Rain, River mile and Result.
- The results were as follows:

Year	2-fold cross -validation	As Training Set
2010	0.6943	0.8078
2010+2011	0.6167	0.7385
2011	0.6664	0.8586

❖ Tri-State - Swimming

- 2010, 2010+2011, 2010+2011+2012, 2011,2012 rain and sampled values for the segment between RM 460.2 (Coney Island) and RM 492 (Lawrenceburg).
- Modeled in Weka using 2-fold cross-validation and as training set.
- Multilayer perceptron used as classifier function with 3 hidden layers(a,10,3).
- Attributes were past 48Hr rain, Maximum of Rain, Cumulative of Rain, River mile and Tri-State.

Modeling

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- The results were as follows:

Year	2-fold cross -validation	As Training Set
2010	87.7298	89.2201
2010+2011	85.1923	88.1154
2010+2011+2012	80.6964	87.6609
2011	75.8092	85.0085
2012	66.667	100

❖ Tri-State – Boating & Fishing

- 2010, 2010+2011, 2010+2011+2012, 2011,2012 rain and sampled values for the segment between RM 460.2 (Coney Island) and RM 492 (Lawrenceburg).
- Modeled in Weka using 2-fold cross-validation and as training set.
- Multilayer perceptron used as classifier function with 3 hidden layers(a,10,3).
- Attributes were past 48Hr rain, Maximum of Rain, Cumulative of Rain, River mile and Tri-State.

Modeling

- The results were as follows:

Year	2-fold cross -validation	As Training Set
2010	93.3433	95.7278
2010+2011	91.8077	93.5
2010+2011+2012	91.9379	94.2468
2011	87.2332	90.971
2012	89.7435	94.8718

Modeling

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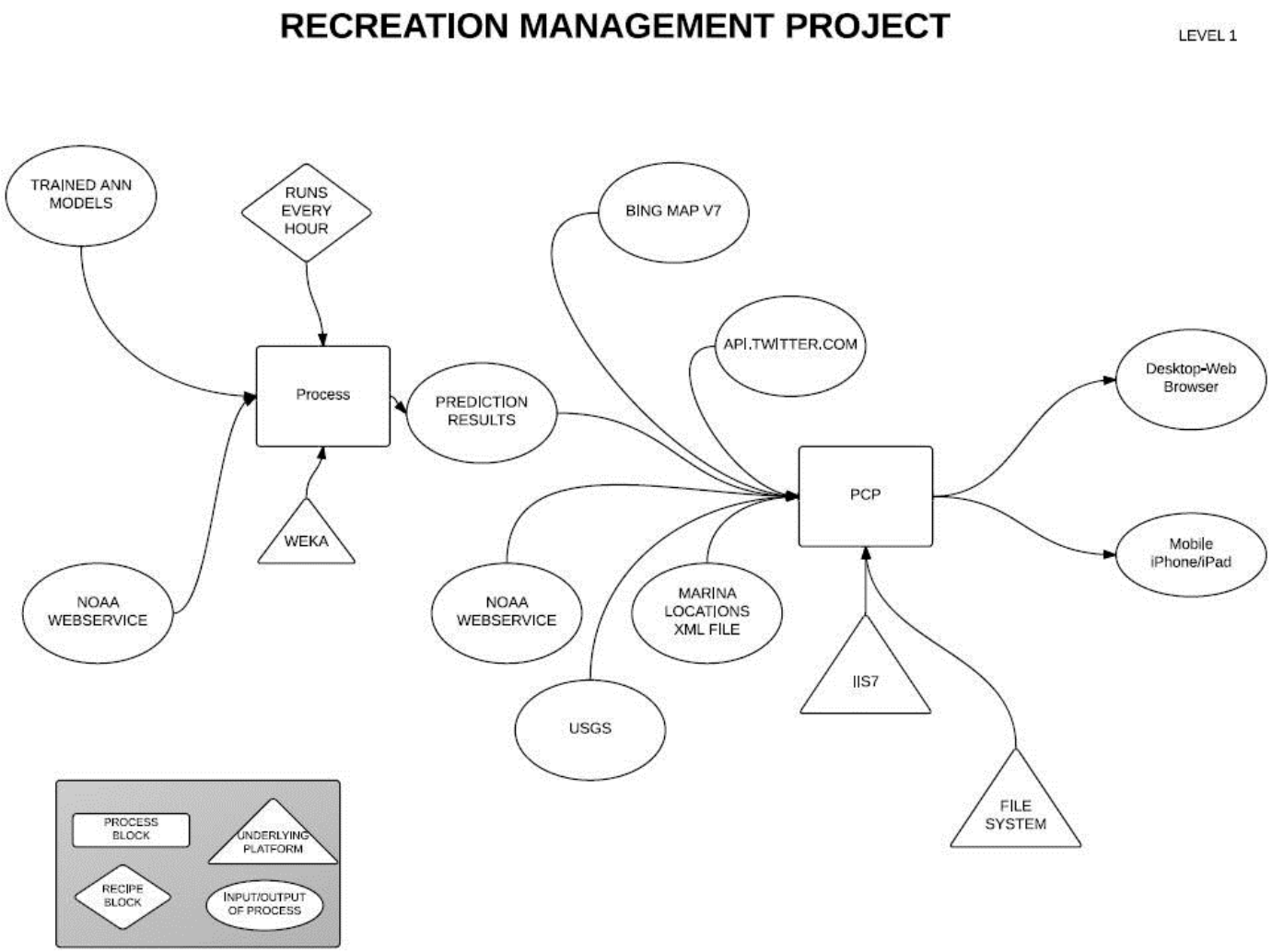
- The results from the modeling were promising
- A correlation of calculated vs measured was on average ~ 90%

System Architecture



System Architecture

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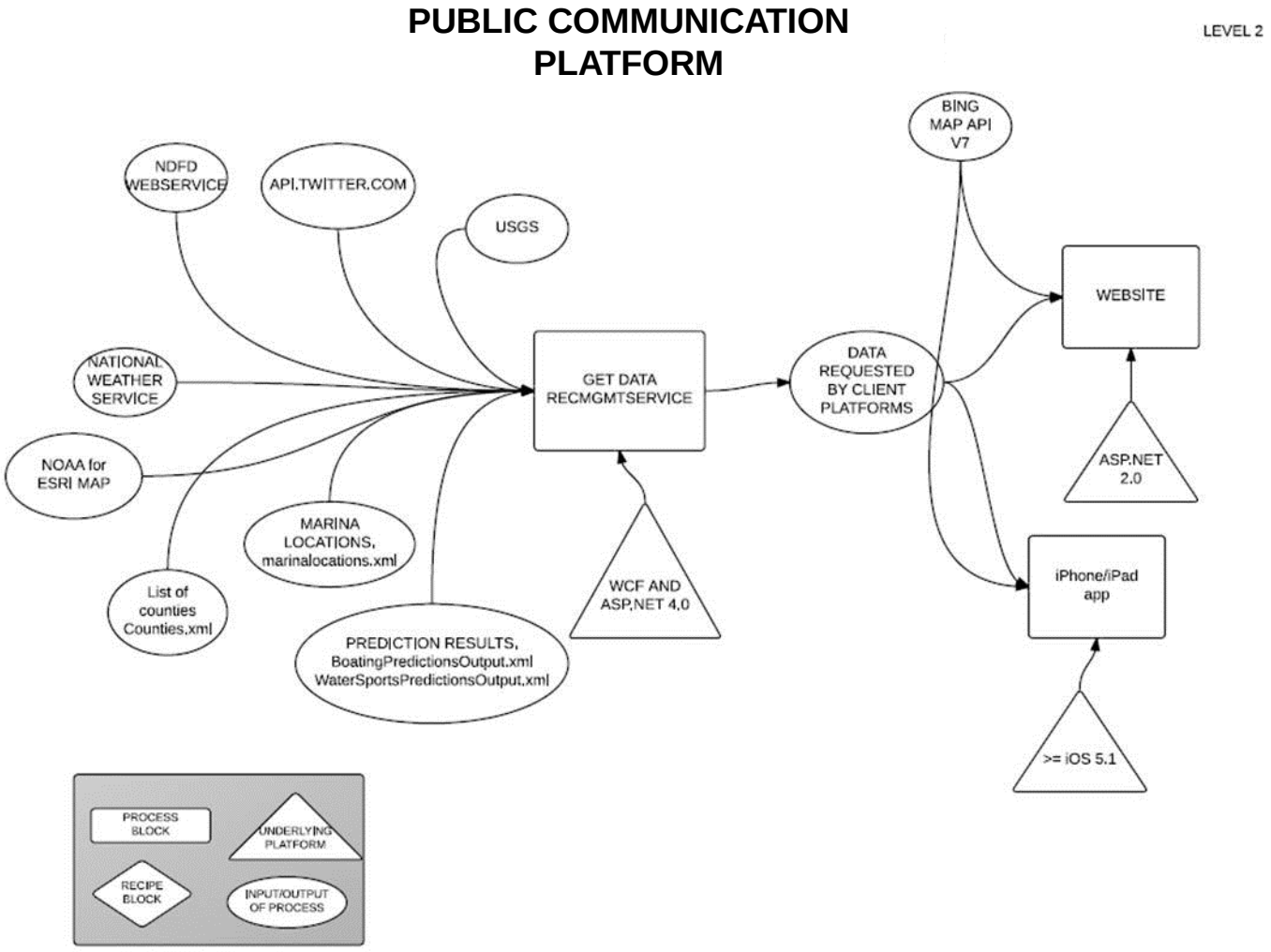

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System Architecture

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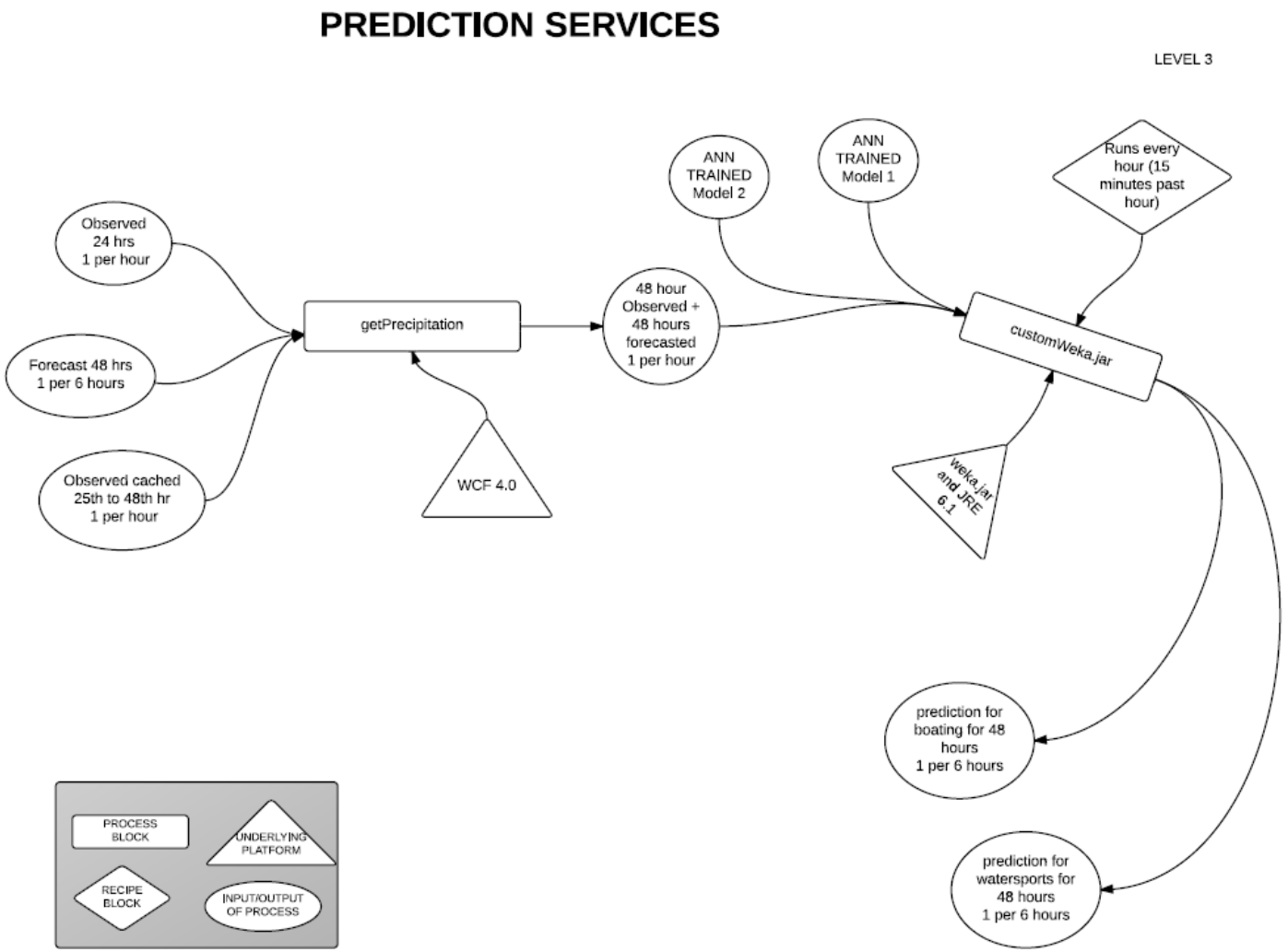

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Recr8OhioRiver
iPhone App & Website

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- iPhone, Droid apps and website are live
- The website is

  http://www.recr8ohioriver.org


County: There are no active watches, warnings or advisories. | Brown County: There are no active watches, warnings or advisories.
RECR8
OHIO RIVER
Helping You Recreate Safely
HOME
RECREATION
WATER QUALITY MATRIX
RIVER REPORT
WEATHER
CONTACT
Weather
Current
Forecast
°C
°F
Oct 04,2012
Partly Sunny
High 78°F
Low 58°F
Oct 05,2012
Rain Showers Likely
60%
High 65°F
Low 46°F
Oct 06,2012
Chance Rain Showers
50%
High 53°F
Low 40°F
Oct 07,2012
Partly Sunny
High 55°F
Low 34°F
Oct 08,2012
Mostly Sunny
High 60°F
Low 41°F
Observed on Oct 03 07:52 AM EDT at Cincinnati (KCVG)
Observations courtesy of USGS/US Army Corps
Recr8OhioRiver app is available on Apple's App store! Download it to your iPhone or iPad today!
Learn more about the Recreation Management Program
Click here for announcements
For all emergencies on the Ohio River, please call U.S. Coast Guard, Sector Ohio Valley: (800) 253-7465
Cincinnati
What's happening
@Recr8OhioRiver
Ohio River
CincinnatiMSD
@CincinnatiMSD
MT @SaveLocalWaters Do You Teach Grades 9 -12 in Hamilton County? Then get your students involved in this... http://t.co/RaZZQ6aC
10/02 09:38AM
CincinnatiMSD
@CincinnatiMSD
Rain expected throughout the week...conditions likely for potential combined #sewer overflows. What are CSOs? http://t.co/900fA1Z0
10/02 09:23AM
CincinnatiMSD
@CincinnatiMSD
RT @NACWA Clean #water is vital to our health, environment and economy. Water is an irreplaceable natural resource...water creates jobs.


Sprint
10:12 AM
Weather
Current
Forecast
°F
°C
Mostly Cloudy
Pressure 1024.0 mb
Humidity 76%
Wind East at 3.5 MPH (3 KT)
43.0°F
Observed on Oct 08 09:52 AM EDT at Cincinnati (KCVG)
Observations courtesy of USGS/US Army Corps
Home
Weather
River
Twitter
More

Ohio River Swim

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Next Steps

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- Continue improving the predictive model
- Add other features based on users' feedback

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Acknowledgements

- Many entities and individuals are helping in making this a success. Special thank you goes to:
  - SD1
  - ORSANCO
  - Green Umbrella
  - Focus group participants

WEF COLLECTION SYSTEMS
CINCINNATI, OH
APRIL 19-22, 2015

Thank You

Questions?

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